

Three new species of *Carniella* from Thailand (Araneae, Theridiidae)

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Three new species of *Carniella* from Thailand (Araneae, Theridiidae). -

Three new species from montane forests in Thailand are tentatively described in *Carniella*, hitherto known only from Europe: *C. siam* n. sp. (♂ ♀), *C. schwendingeri* n. sp. (♂) and *C. orites* n. sp. (♀). Habitat and relationships are discussed. The following new combinations, all from *Theonoe* (Theridiidae), are proposed: *C. globifera* (Simon, 1899), Sumatra; *C. weyersi* (Brignoli, 1979), Sumatra; *C. detriticola* (Miller, 1970), Angola. For comparison, the ♀ epigyne/vulva of *C. weyersi* is illustrated.

Key-words: Araneae - Theridiidae - Taxonomy - *Carniella* - *Theonoe* - Thailand.

INTRODUCTION

The enigmatic genus *Carniella*, recently described in Theridiidae by THALER & STEINBERGER (1988), was known hitherto only from mid Europe by 5 males collected in Austria, Bavaria (DRÖSCHMEISTER 1994) and Belgium (BAERT & VAN KEER 1991), belonging to the type species *C. brignolii*. The female of *C. brignolii* is still unknown, and its habitat and distribution are not yet clear. However, the genus *Carniella* seems to be represented by numerous species in SE-Asia. There exist clearly related species, as has already been indicated by WUNDERLICH (1994). Three further *Carniella* species collected by P. Schwendinger in Thailand are described in this paper.

ABBREVIATIONS

E embolus, f tegular fold, Pc paracymbium, S subtegulum, T tegulum, TA tegular apophysis. - CTh Thaler collection. MHNG Muséum d'histoire naturelle, Genève. MHNP Muséum d'Histoire naturelle, Paris.

Carniella siam n. sp.

(Figs 1, 4–6, 9–15, 21, 22)

Material examined: Holotype: ♂ (MHNG), Doi Ankhang 1500 m, 30.10.1987. Paratypes: 1 ♂ (CTh), 1 ♀ (MHNG), Doi Ankhang 1500 m, 30.10.1987. 1 ♀ (MHNG), Huay Nam Dang 1400 m, 17.12.1990. 1 ♂ (MHNG), Doi Inthanon 1780 m, 3.3.1987. 1 ♂ (CTh), Doi Inthanon 1020 m, 17.2.1987. 1 ♀ (CTh), Doi Suthep 1150 m, 14.2.1987. All specimens leg. P. Schwendinger in Chiang Mai Province, N-Thailand.

Diagnosis: ♂ clypeus modified (Figs 1, 5, 6). *C. siam* can be recognised by genital characters only, embolus (♂) (Figs 13–15), epigyne/vulva (♀) (Figs 21, 22).

Description: ♂: Measurements (mm): carapace 0.57 long, 0.46 wide. Length of abdomen 0.59, sternum 0.34 long.

Colour: Carapace brown with dark seam at its margins and a median greyish marking. Sternum and legs brown, trochanters and patellae light brown. Abdomen dark grey, epigaster grey brown.

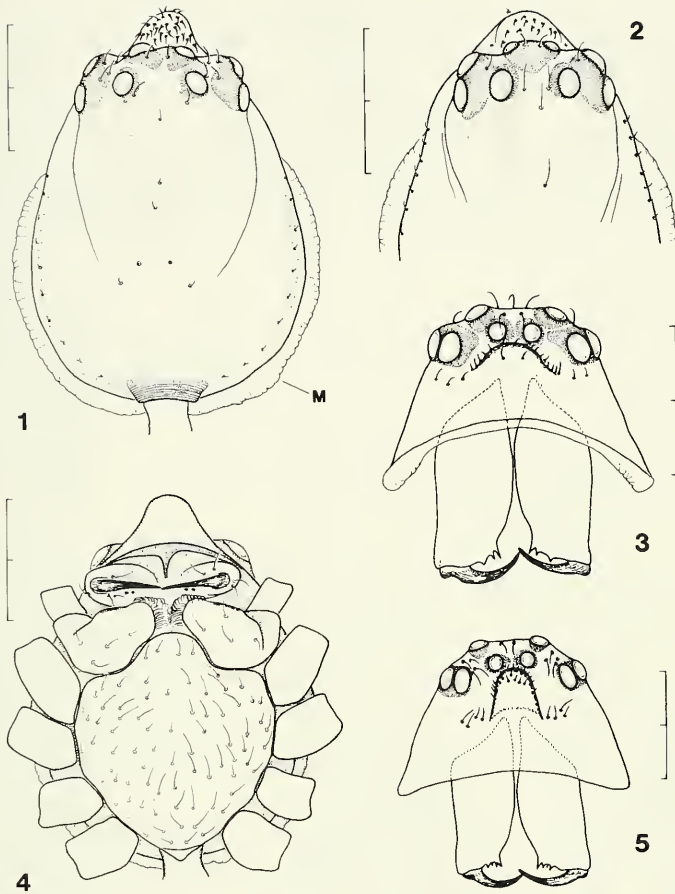
Clypeal projection of carapace conspicuous (Figs 1, 5, 6), covered with short hairs. Sides of carapace with bulging membrane (M, Fig. 1). Chelicerae: Basal extension typically theridiid, anterior margin of fang groove with 3 teeth, posterior margin with 2 teeth. Sternum pointed behind (Fig. 4). Labium fused with sternum, not rebordered. Stridulatory organ present, not divided in midline (Fig. 1). Abdomen weakly sclerotised around pedicel, with dorsal circle of warty hairs (stridulatory warts). Colulus large, 2 setae present.

Leg measurements (mm):

	Fe	Pa	Ti	Mt	Ta	Total
Palp	0.22	0.12	0.08	–	0.25	0.67
I	0.37	0.14	0.30	0.22	0.26	1.30
II	0.35	0.14	0.24	0.18	0.24	1.14
III	0.28	0.11	0.20	0.15	0.22	0.96
IV	0.38	0.14	0.31	0.19	0.25	1.26

Legs: 1423. Trichobothrial pattern (numbers of prodorsal/retrodorsal trichobothria of tibiae) of legs I, II, IV identical in all specimens [$n = 5$]: I–II 1/2, IV 2/2, their position on I 0.18/0.11;0.31, on IV 0.11;0.27/0.29;0.56. Pattern of tibia III apparently somewhat variable: 1/2 [$n = 3$], 2/1 [$n = 1$], 2/2 [$n = 1$]. Metatarsi I–II with 1 trichobothrium (0.34). Distal metatarsi ventrally with few weak serrate bristles. Tarsal organ I–IV (0.26–0.34). Tarsi I–IV 1.2–1.5 times longer than metatarsi. Tarsi I–IV ventrally with 2 rows of 6–7 serrate bristles, as in ♀, Fig. 12. Tarsal claws with ca. 3 minute teeth.

♂ **Palp:** Figs 11, 13–15. Tibia cone-shaped, without trichobothrium. Tarsus not twisted. Cymbium in dorsal position, slender, distally modified, its tip presumably supporting the embolus. Paracymbium hook-like, arising proximally from the retrolateral margin of the cymbium. Subtegulum prolateral-dorsal, with large hematodocha. Tegulum prolateral-dorsal (Fig. 11), with one dorsal tegular apophysis, which is partly hidden by the cymbium. Conductor absent. Tegular apophysis with



FIGS 1-5

Carniella siam n. sp., male (1, 4, 5, Doi Inthanon). *C. schwendingeri* n. sp., male (2, 3).
Carapace, dorsal (1, 2), ventral (4) and frontal view (3, 5). Scale lines 0.2 mm.

loop of the sperm duct (Fig. 11), lamellate at its anterior border, its retrolateral end with concavity which presumably is anchored to the paracymbium when expanded. The embolus is the most striking character for its dark sclerotisation, distal part slender and slightly curved, with short accessory spur. Embolar base evenly narrow. The constricted part of the sperm duct crosses the tegulum and enters the tegular apophysis prolaterally, where it makes a loop, then curves retrolaterally into the embolar base.

♀: Measurements (mm): carapace 0.48 long, 0.42 wide. Length of abdomen 0.64.

Colour: similar to male.

Carapace not modified, stridulatory ridges reduced. Sternum and labium as in male. Chelicerae (Fig. 10): anterior margin of fang groove with 3 teeth, posterior margin with 2. Spinnerets (Fig. 9): Colulus large, 2 setae present. Posterior lateral spinnerets with two modified spigots, but not widened and therefore not typically theridiid.

Leg measurements (mm):

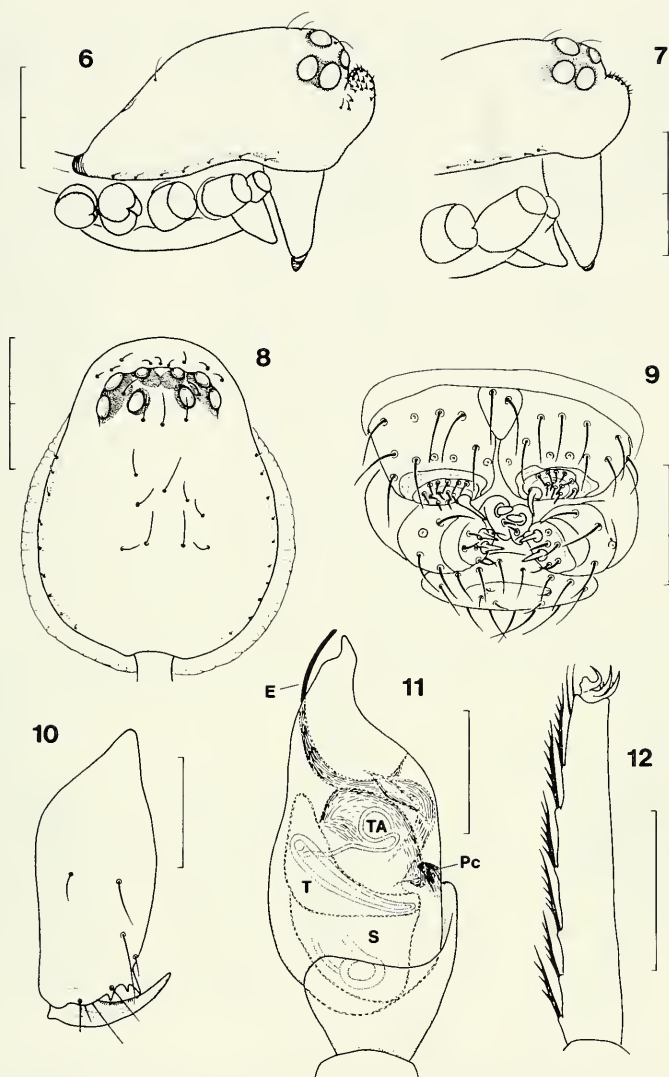
	Fe	Pa	Ti	Mt	Ta	Total
Palp	0.14	0.07	0.10	—	0.15	0.46
I	0.30	0.14	0.24	0.16	0.22	1.05
II	0.28	0.14	0.22	0.14	0.22	0.99
III	0.25	0.12	0.16	0.12	0.20	0.84
IV	0.31	0.14	0.27	0.16	0.22	1.10

Legs: 4123. Numbers of prodorsal/retrodorsal trichobothria of tibiae I 1/2, II 1/2, IV 2/2 identical in all specimens [$n = 3$], as in male, their position on I 0.16/0.13;0.34, on IV 0.13;0.33/0.37;0.63. Pattern of tibia III again variable: 1/2 [$n = 1$], 2/2 [$n = 2$]. Metatarsi I–II with 1 trichobothrium (0.40; 0.38). Distal metatarsi ventrally with few weak serrate bristles. Tarsal organ I–IV (0.26–0.31). Tarsi I–IV 1.4–1.7 times longer than metatarsi. Tarsi I–IV ventrally with 2 rows of 6–7 serrate bristles (Fig. 12), with straight side teeth. Tarsal claws with 3–4 minute teeth. ♀-palp: claw with 2 tiny teeth.

♀ Epigyne/vulva: Figs 21, 22. Epigynal groove small, roughly triangular. Introductory ducts membranous with wide lumen. They run forwards, turn back and lead posteriorly into the receptacula. Dorsal recurrent part of introductory ducts extending beyond receptacula. Inner end of introductory duct more sclerotised, its lumen constricted. Receptacula seminis anterior to epigynal groove. Fertilization ducts long, connected by a sclerotised bridge.

Arguments for matching of sexes: *C. siam* ♂ occurred twice in the samples together with females. Unfortunately these females belong to different species! 2 ♂ 1 ♀ collected at Doi Angkhang 1500 m are thought to be conspecific, because of the altitude of this locality and restricted collecting at a small site only. Two other conspecific ♀ came from Doi Suthep 1150 m and Huay Nam Dang 1400 m, again at comparatively moderate altitude. 1 ♀ collected at Doi Inthanon 1780 m together with 1 ♂ of *C. siam* apparently belongs to another species, *C. orites* n. sp., which occurs at higher elevations. It was captured also at 2500 m! As collecting was done at Doi Inthanon by sieving over a large area, it is likely that the ♂ ♀ were not taken together.

E t y m o l o g y : noun in apposition, which refers to the former name of Thailand.



FIGS 6-12

Carniella siam n. sp., male (6, 11, Doi Inthanon), female (9, 10, 12, Doi Suthep). *C. schwendingeri* n. sp., male (7). *C. orites* n. sp., female (8). ♀ Spinnerets (9). ♀ Chelicera, frontal view (10). ♂-palp, dorsal view (11). ♀ Tarsus IV (12). Scale lines 0.2 mm (6-8), 0.05 mm (9), 0.1 mm (10-12).

Distribution, habitat: *C. siam* is known from 4 localities in NW-Thailand, Chiang Mai Province. Most specimens were sieved from litter of evergreen lower montane forests at Doi Inthanon and at Doi Suthep, with Dipterocarpaceae and oaks predominant, from about 1000 m up to 1780 m. The species is not restricted to dense woodland. 2 ♂ 1 ♀ came from sieving herb litter in a deforested small valley with a stream at Doi Angkhang, 1 ♂ was taken in a pine forest (*Pinus merkusii*, *P. keyisia*) with needle litter and little undergrowth at Doi Inthanon 1020 m. The habitat at Huay Nam Dang was a fragmented evergreen montane forest at 1400 m.

***Carniella schwendingeri* n. sp.**

(Figs 2, 3, 7, 16–18)

Material examined: Holotype: ♂ (MHNG), Khao Khieo 1020 m, Khao Yai National Park, Nakhon Ratchasima Province, NE-Thailand, 24.12.1992, P. Schwendinger leg.

Diagnosis: ♂ clypeal knob low (Fig. 3), ♂ palp with distinctive embolus (Figs 16–18). ♀ unknown.

Description: ♂ Measurements (mm): carapace 0.48 long, 0.40 wide. Length of abdomen 0.60. Sternum 0.28 long.

Colour: Carapace brown, with dark seam at its margins. Sternum and legs of same colour, patellae, trochanters and distal part of femora light brown. Abdomen grey, epigaster grey-brown.

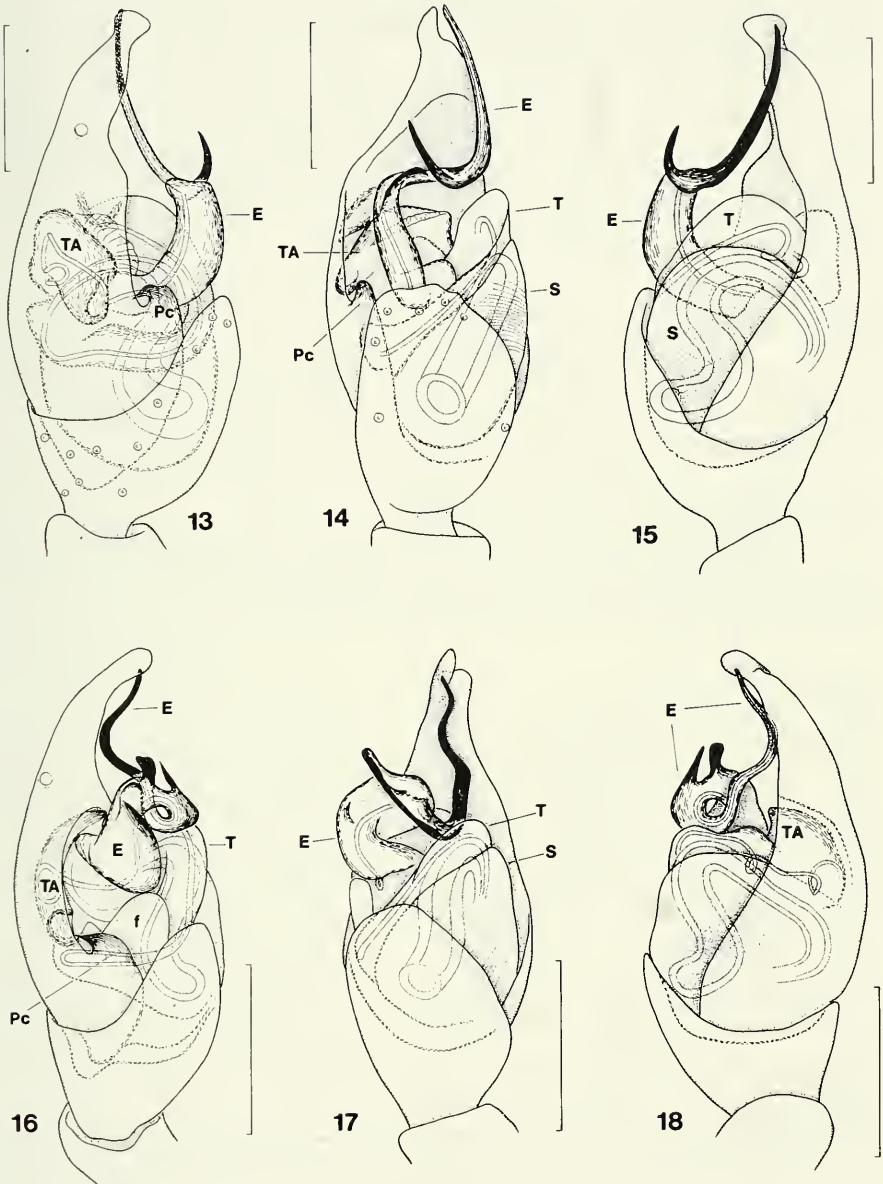
Clypeal projection less protuberant than in *C. siam* (Figs 2 vs. 1, 3 vs. 5, 7 vs. 6), covered with few short hairs. Sternum, labium, chelicerae and stridulatory organ as in *C. siam*. Sides of carapace also with membrane. Colulus large, with 2 setae.

Leg measurements (mm):

	Fe	Pa	Ti	Mt	Ta	Total
Palp	0.19	0.10	0.04	–	0.20	0.54
I	0.33	0.13	0.25	0.17	0.22	1.10
II	0.28	0.12	0.20	0.14	0.21	0.96
III	0.23	0.10	0.18	0.12	0.20	0.82
IV	0.32	0.13	0.26	0.16	0.22	1.10

Legs: I = 423. Numbers of prodorsal/retrodorsal trichobothria of tibiae I–II 1/2, III–IV 2/2, their position on I 0.14/0.08;0.30, on IV 0.11;0.28/0.30;0.60. Metatarsi I–II with 1 trichobothrium (0.35; 0.41). Tarsal organ I–IV (0.21–0.26). Tarsi I–IV 1.3–1.7 times longer than metatarsi. Tarsal claws with 3–4 minute teeth. Serrate bristles of legs I–IV as in *C. siam*.

♂ Palp: Figs 16–18. Tibia cone-shaped, without trichobothrium. Cymbium not twisted, slender, distally indented (Fig. 17), with basal hook-like paracymbium (Fig. 16). Subtegulum and course of sperm duct as in *C. siam*. Tegulum with transparent retrolateral fold (f, Fig. 16). Conductor absent. Tegular apophysis elongate, containing a loop of the sperm duct, in retrolateral-dorsal position, its retrolateral end presumably



FIGS 13-18

Carniella siam n. sp. (13-15, Doi Inthanon). *C. schwendingeri* n. sp. (16-18). Male palp, retrolateral (13, 16), ventral (14, 17) and prolateral view (15, 18). Scale lines 0.1 mm.

locking with paracymbium. Embolus a complex heavily sclerotised structure, its base broad, median part with 2 small side projections, one of which pointed, the other truncate, distal part slightly twisted.

E t y m o l o g y : The species is named after its collector.

D i s t r i b u t i o n , h a b i t a t : Known only from the type locality at Khao Khieo in the Khao Yai National Park. The specimen was collected by sieving moist leaf litter in semi-evergreen rain forest, with Dipterocarpaceae predominant, at 1020 m. Khao Yai belongs to an isolated mountain range in Central Thailand, distance from the localities of *C. siam* and *C. orites* ca. 500 km.

Carniella orites n. sp.

(Figs 8, 19, 20)

M a t e r i a l e x a m i n e d : Holotype: 1 ♀ (MHNG), 2400 m, 9.2.1986. Paratypes: 1 ♀ (MHNG), 1780 m, 3.3.1987. 1 ♀ (CTh), 2500 m, 14.7.–20.8.1987, pitfall trap. All specimens leg. P. Schwendinger at Doi Inthanon, Chiang Mai Province, N-Thailand.

D i a g n o s i s : ♀ epigyne/vulva (Figs 19, 20). ♂ unknown.

D e s c r i p t i o n : ♀: Measurements (mm): carapace 0.45 long, 0.40 wide. Length of abdomen 0.66. Sternum 0.30 long.

Colour: Carapace and legs brown, patellae light. Abdomen greyish.

Clypeus not modified (Fig. 8), stridulatory organ absent. Sternum, labium, chelicerae and spinnerets as in *C. siam*. Colulus with 2 setae.

Leg measurements (mm):

	Fe	Pa	Ti	Mt	Ta	Total
Palp	0.15	0.08	0.08	–	0.14	0.44
I	0.30	0.13	0.21	0.15	0.21	1.00
II	0.28	0.13	0.19	0.14	0.20	0.94
III	0.22	0.10	0.16	0.12	0.19	0.78
IV	0.31	0.14	0.26	0.15	0.22	1.07

Legs: 4123. Numbers of prodorsal/retrodorsal trichobothria of tibiae I–III 1/2, IV 2/2 (n = 3), their position on I 0.17/0.11;0.30, on IV 0.12;0.32/0.39;0.63. Metatarsi I–II with 1 trichobothrium (0.43; 0.46). Tarsal organ I–IV (0.26–0.31). Tarsi I–IV 1.4–1.6 times longer than metatarsi. ♀-palp: claw with one tiny tooth. Tarsal claws with 3–4 minute teeth. Serrate bristles on legs I–IV as in *C. siam*.

Epigyne/vulva: Figs 19, 20. Epigynal groove larger than in *C. siam*, oval, anterior border semi-circular, median sclerotised structure present. Ventral part of introductory duct pear-shaped, widened posteriorly, dorsal recurrent part not extending laterally beyond receptaculum. Receptacula seminis at anterior border of epigynal groove. Glandular pores at inner end of introductory ducts and on receptacula. Fertilization ducts similar to *C. siam*.

E t y m o l o g y : The specific name refers to the high montane habitat.

Distribution, habitat: Known only from Doi Inthanon, Chiang Mai Province, in montane forest from 1780 m up to the summit 2500 m. Lowest occurrence at 1780 m together with *C. siam*. The summit forest is heavily covered with moss, owing to prevalent cloud cover.

Carniella weyersi (Brignoli, 1979) nov. comb.

(Figs 23, 24)

Theonoe weyersi Brignoli, 1979

Material examined: 2 ♀ (holotype and paratype), Sumatra, Weyers leg., Coll. Simon, AR 1020 MHNP (see BRIGNOLI, 1979).

Description: Measurements (mm): Holotype: carapace 0.44 long, 0.31 wide. Length of abdomen 0.50. Paratype: carapace 0.44 long, 0.33 wide.

Sides of carapace with membrane. Spinnerets as in *C. siam*.

Legs: Numbers of prodorsal/retrodorsal trichobothria of tibiae I–II 1/2, III–IV 2/2 (n = 2). Metatarsi I–II with 1 trichobothrium.

Epigyne/vulva: Figs 23, 24. Epigynal groove large, oval, with median triangular cavity, where the introductory ducts apparently begin. Ventral part of introductory duct as a short membranous atrium, dorsal part membranous, with wide lumen, forming a loop, sclerotised part with constricted lumen, leading directly backwards into the receptaculum. Receptacula seminis at posterior border of the epigynal groove. Glandular pores near the entrance of the introductory ducts. Fertilization ducts similar to *C. siam*.

New combination, synonymy: “*T. weyersi* does not belong to *Theonoe* according to its epigyne/vulva, but is clearly allied to *Carniella*: epigynal groove, course and form of introductory ducts correspond basically to the Thai species, though these differ specifically. Vulval structures resemble those of *C. detriticola*. *C. weyersi* and *C. detriticola* probably belong to another species group.

The possibility cannot be excluded that “*Theonoe weyersi*” in SIMON (1926) is merely an error and not a nomen nudum as thought by BRIGNOLI (1979). The species was formally described by Brignoli from 2 ♀ found in the Simon collection, named “*T. weyersi*”. SIMON (1899) described only 1 *Theonoe* species from Sumatra, *T. globifera* (♂ ♀), which was followed by the description of *Iardinis weyersi*. Possibly therefore the ‘nomen nudum’ *T. weyersi* in SIMON (1926) and in his collection might be only a slip of the pen.

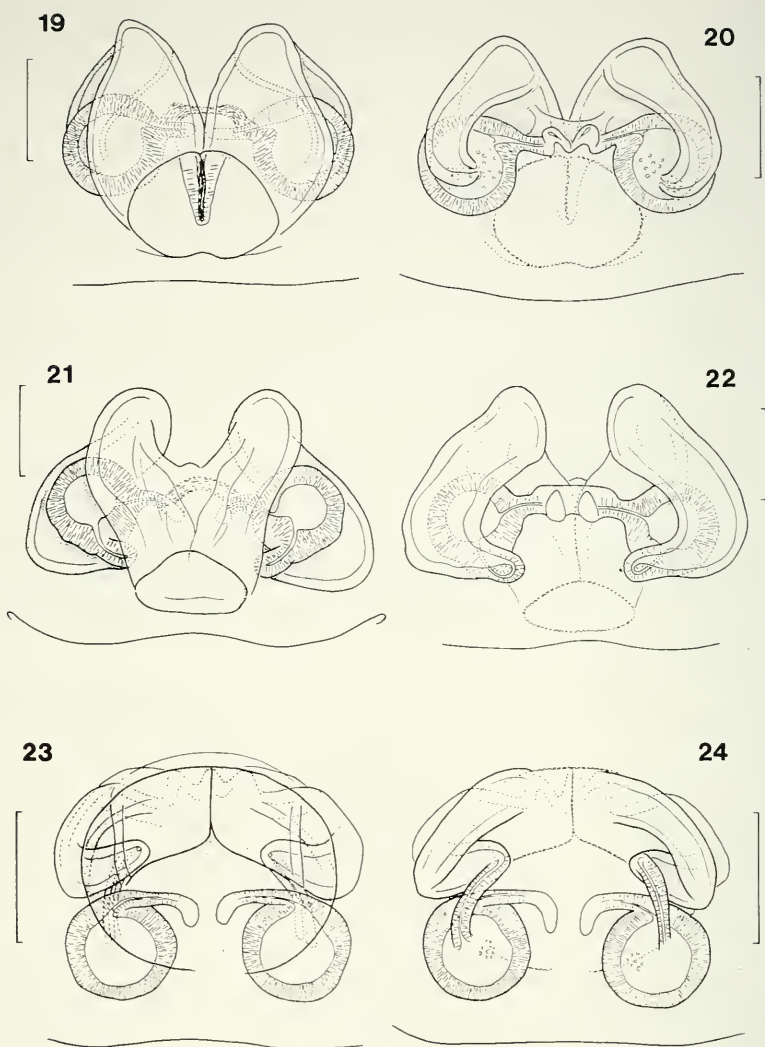
Theonoe weyersi has also been recorded from China, Mount West Tianmu. The figures of epigyne/vulva in SONG & KIM (1991, fig. 8, 9) do not correspond clearly to the females from Sumatra, as the receptacula are shown antero-laterally to the epigynal groove. The identity of this specimen should be reinvestigated.

Carniella globifera (Simon, 1899) nov. comb.

Theonoe globifera Simon, 1899

C. weyersi (Brignoli, 1979) ?

According to the description of SIMON (1899), *Theonoe globifera* from Sumatra belongs to *Carniella*: male as in *C. brignolii* with characteristic globular



FIGS 19–24

Carniella orites n. sp. (19, 20). *C. siam* n. sp. (21, 22, Doi Suthep). *C. weyersi* (Brignoli) (23, 24). Epigyne/vulva, ventral (19, 21, 23) and dorsal view (20, 22, 24). Scale lines 0.05 mm.

clypeal protuberance (SIMON 1899: 86). ♂ palp with long slender cymbium (“*tarso magno, ovato, longe acuminato*”) and with complicated, heavily sclerotised embolus (“*loboque apicali nigro subtriquetro, stylo gracili apicali instructo, minuto*”). The species was taken around Indrapoera, ca. 150 km south of Padang on the mountainous W-coast of Sumatra.

Specimens labelled as *T. globifera* cannot now be traced in the Paris collection. Concerning *C. weyersi* see above.

Carniella detriticola (Miller, 1970) nov. comb.

Theonoe detriticola Miller, 1970

This African species must also be transferred to *Carniella*. The following characters support this new combination: shape of sternum, tarsi longer than metatarsi, tarsi I–IV with serrate bristles, vulva of similar structure, membranous ventral part of introductory ducts wide, sclerotised part constricted, receptacula close to the epigastric furrow (fig. 5, p. 158, MILLER 1970). *C. detriticola* stands close to *C. weyersi*, their vulval structures being quite similar. *C. detriticola* was found in ground litter of a gallery forest at Luisavo waterfall (Angola) at 1300 m (18.2.1955). ♂ unknown.

DISCUSSION

AFFINITIES

The new species described from Thailand are clearly related to *Carniella brignolii* THALER & STEINBERGER (1988), recently described from Europe. Important common characters are: ♂ clypeal modification present, cymbium distally modified, paracymbium proximal, conductor absent, embolus complicated. Apparently the “terminal apophysis” of THALER & STEINBERGER (TA figs 11, 14) is the embolar base. In the Asian species there is no prominent basal hematodocha and the tarsus of the male palp is not twisted, so probably these belong to another species group. WUNDERLICH (1994) has reported on further relatives in SE-Asia.

The species described by SIMON, BRIGNOLI & MILLER were placed hitherto in *Theonoe*. Therefore it might be useful to indicate diagnostic differences:

		<i>Carniella</i>	<i>Theonoe</i>
♂	– clypeus	modified	not modified
	– paracymbium	proximal	distal
	– conductor	absent	present
	– embolus	complicated	short
♀	– introductory ducts	long, widened	short, narrow

Characters common with *Theonoe* are: ♂ stridulatory organ present; colulus relatively large, with 2 setae; tarsi I–IV with serrate bristles; tarsi longer than metatarsi; ♂-palpal tibia cone-shaped, without trichobothrium; cymbium distally modified; tegular apophysis anchored to paracymbium (HEIMER 1982), with loop of sperm duct. Most of these characters apparently qualify as plesiomorphic. For details on *Theonoe* see WIEHLE (1937) and LEVI & LEVI (1962).

Owing to the exceptional proximal position of the paracymbium FORSTER *et al.* (1990) suggested a separation of *Carniella* from Theridiidae. However, the male palp

of *Carniella* shows locking system A of this family (SAARISTO, 1978): paracymbium hook-like, presumably anchoring the tegular apophysis in the expanded palp. Also, this apophysis contains a loop of the sperm duct. As in Theridiidae, in *Carniella* the tibia is cone-shaped, without apophyses; labium not rebordered, chelicerae with basal extension. Also the stridulatory organ is typically theridiid.

Nevertheless, *Carniella* lacks the typically widened spigots on the posterior lateral spinnerets as well as the theridiid tarsal comb on leg IV. Instead, 2 rows of serrate bristles are present on tarsi I–IV, as in *Theonoe*. In another small soil-dwelling spider, *Comaroma simoni* Bertkau (Anapidae), similar serrate bristles on legs I–IV are used for cleaning, not for manipulating viscid silk during prey capture (KROPF 1989). So a cleaning function of tarsi I–IV in *Carniella* and *Theonoe* is likely.

DISTRIBUTION

Several species of *Carniella* are now known from montane forests in SE-Asia: *C. globifera* and *C. weyersi* from Sumatra (SIMON 1899; BRIGNOLI 1979), "*C. weyersi*" from China (SONG & KIM 1991), and 3 species described herein from Thailand (*C. siam*, *C. schwendingeri*, *C. orites*). Another species, *C. detriticola*, was recorded from montane forest in Angola (MILLER 1970). The type species *C. brignolii* occurs in mid-Europe: Austria, Bavaria and Belgium. It was found on a southerly exposed slope with stones and sparse vegetation (HALER & STEINBERGER 1988), on a gravel bank of a river (DRÖSCHMEISTER 1994) and in an abandoned quarry with sparse vegetation (BAERT & VAN KEER 1991). In the tropics *Carniella* apparently is confined to montane regions. The reasons for the disjunct distribution of the genus *Carniella* in SE-Asia, Africa and Europe are not yet understood.

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ADDENDUM

When this paper was in press, two further *Carniella*-species were described from Indonesia (WUNDERLICH 1995): *C. krakatauensis* (♂) from Anak Krakatau, *C. sumatraensis* (♂ ♀) from N-Sumatra. *C. schwendingeri* is similar to *C. krakatauensis*.

WUNDERLICH, J. 1995. Südostasiatische Arten der Gattung *Carniella* THALER & STEINBERGER 1988, mit zwei Neubeschreibungen (Arachnida: Araneae: Theridiidae). *Beiträge zur Araneologie*, 4 (1994): 553–558.